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Four lichens of the genus *Lecidea* from China

Lu-Lu Zhang[1], Hai-Ying Wang[1], Li-Yan Sun[2] & Zun-Tian Zhao[1]*

*lichenzll@yahoo.com.cn & * ztzhao@sohu.com*
[1]College of Life Sciences, Shandong Normal University
Jinan, 250014, P. R. China

[2]College of Pharmacology, Taishan Medical University
Taian, 271016, P. R. China

Abstract — Two species (*Lecidea berengeriana*, *L. confluens*) and one variety (*L. lapicida* var. *pantherina*) new to China and an unknown species of *Lecidea* are reported. Photos of the thalli are presented.

Key words —*Lecideaceae*, Asia, taxonomy

Introduction

The genus *Lecidea (Lecideaceae)* was established by Acharius (1803). Its originally extremely wide circumscription became reduced step by step. Zahlbruckner used *Lecidea* in an extraordinary wide circumscription, accepting more than 1350 taxa in the rank of species. Subsequently, many obviously unnatural units have been excluded (e.g. *Adelolecia*, *Amygdalaria*, *Biatora*, *Carbonea*, *Claurouxia*, *Clauzadea, Melanolecia*, *Micarea*, *Miriquidica*, *Nesolechia*, *Porpidia*, *Psilolechia*, *Psora*, *Pyrrhospora*, *Rimularia*, *Schaereria*, *Tephromela*, *Trapelia, Trapeliopsis, Tylothallia*). *Lecidea* s. str. became a medium-sized (about 100 species), almost exclusively saxicolous genus (Hertel 1995), based on the structure of the ascomata, especially the nature of the hamathecial tissues, ascus apical structures, and exciple (Purvis et al. 1992, Hertel 1995). Hertel (1967, 1977, 1995) based his narrow concept of *Lecidea* s. str. on the type species, *Lecidea fuscoatra* (L.) Ach. However, there are still many taxa included in *Lecidea* that obviously do not belong in *Lecidea* s. str. (Hertel 2004).

Worldwide, *Lecidea* s. lat. includes about 400 known taxa. In China, 31 *Lecidea* s. lat. species have been reported (Wei 1991; Abass & Wu 1998; Aptroot 2002, 2003; Guo 2005). During our study of lichen flora of western China, one unknown species, two species, and a variety of *Lecidea* s. lat. new to China were found.

Materials and methods

The specimens examined are preserved in SDNU (Lichen Section of Botanical Herbarium, Shandong Normal University) or HMAS-L (Lichen Section, Herbarium of Mycology, Institute of Microbiology, Academia Sinica).

Thalli were examined and measured under dissecting microscope (COIC XTL7045B2). Characteristics of the apothecia were investigated by microscope (OLYMPUS CX21). Photos of the thalli were taken under OLYMPUS SZX12 with DP70. The chemical constituents were identified using thin layer chromatography (TLC) (Culberson 1972).

The new records

1. ***Lecidea berengeriana*** (A. Massal.) Nyl., Not. Sällsk. Fauna Fl. Fenn. Förh. 8: 144 (1866) Fig. 1a

≡ *Biatora berengeriana* A. Massal., Ric. Auton. Lich. Crost.: 128 (1852)

Thallus grayish to greenish-gray, verrucose, surface dull, esorediate; medulla I–. Apothecia sessile with a constricted base, 0.5–1.2 mm wide, flat and marginate when young but soon convex and immarginate, dark brown or blackish; exciple and hypothecium dark reddish brown, but outer edge of exciple colourless, giving the appearance of a thalline exciple; epithecium yellowish brown; hymenium 55–75 μm high, hyaline to pale yellowish, I+ blue, then turn red; hypothecium above dark reddish brown, below usually paler. Paraphyses 1.5–3 μm wide, becoming clavate to capitate and brown-walled at apices and to 6 μm wide, mostly simple. Asci *Porpidia*-type, 8-spored. Ascospores: hyaline, simple, fusiform-ellipsoid, 7.5–12.5 × 3–5 μm.

Spot tests: thallus K–, C–, KC–, P–

Secondary metabolites: none

Specimens examined: CHINA. **Gansu**, Tulugou, National forest park, on moss, alt. 2800 m, 19 Aug. 2007, J.G. Liu, 20072126 (SDNU); **Qinghai,** Qilian country, Mt. Niuxinshan, on moss, alt. 3200 m, 11 Aug. 2007, Z.S. Sun, LQ350(SDNU).

Comments — *L. berengeriana* does not belong to the genus *Lecidea* s. str., but because its generic position is still unclear, it is retained in *Lecidea*. It is close to *L. hypnorum* and *L. sanguineoatra* but distinguished by its tartareous thallus and much broader, brown-walled apices of the paraphyses.

L. berengeriana has been reported from circumpolar in boreal regions of the Northern Hemisphere (Hertel & Printzen 2004). New to China.

2. ***Lecidea confluens*** (Weber) Ach., Meth. Lich.: 14 (1803) Fig. 1b

Thallus well developed, whitish gray, irregularly rimose-areolate. Medulla I+ blue. Apothecia black, 0.5–1.1 mm wide, immersed to ± sessile, arising between

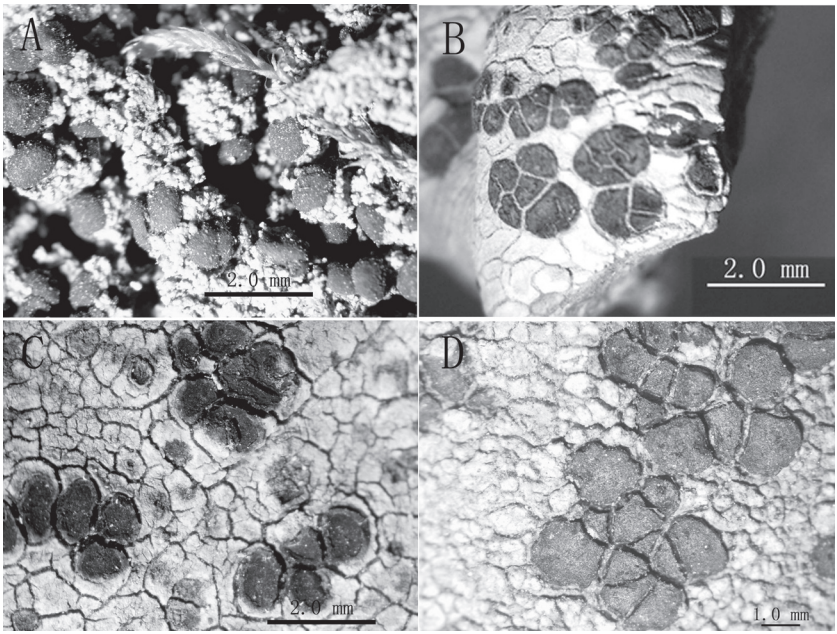

Fig. 1 Thalli of *Lecidea* species examined in the present study. A. *Lecidea berengeriana*, J.G Liu 20072126 (SDNU). B. *Lecidea confluens*, Z.T. Zhao 20071834 (SDNU). C. *Lecidea lapicida* var. *pantherina*, X.Y. Wang 025318 (HMAS-L). D. *Lecidea* sp. 1, J.G Liu 20071571-1 (SDNU).

the areoles; disc plane to slightly concave, epruinose, margin prominent; exciple blackish at out edge, colourless within; epithecium blackish green, hymenium colourless, 50–60 μm high; hypothecium dark brown. Asci *Lecidea*-type, 8-spored. Ascospores: hyaline, simple, ellipsoid, 8–10 × 3.5–5 μm.

Spot tests: K–, C–, KC–, P–

Secondary metabolites: confluentic acid

Specimen examined: CHINA. **Qinghai,** Xiangride country, Mt. Tuotushan, on rock, alt. 3080 m, 15 Aug. 2007, Z.T. Zhao, 20071834 (SDNU).

Comments — *L. confluens* is morphologically close to *L. lapicida* and *L. tessellata*, but *L. confluens* has wider areoles, brown to dark brown hypothecium and smaller ascospores than *L. lapicida*, besides *L. lapicida* producing stictic or norstictic acid. *L. tessellata* has an almost colourless hypothecium and a bit smaller, blunter and more thick-walled ascospores. *L. confluens* has been reported from Eurasia, North America, and India (Upreti et al. 2006). New to China.

3. ***Lecidea lapicida*** var. ***pantherina*** (Hoffm.) Ach., Kongl. Vetensk. Akad. Nya Handl. 29: 232 (1808) Fig. 1c

= *Lecidea lactea* Flörke ex Schaer., Lich. Helv. Spicil. 3: 127 (1828)

Thallus bluish-gray with yellow shade, medium, irregulately cracked-areolate, areolate plane; medulla I+ intensively violet-blue. Hypothallus ± distinct, black. Apothecia black, subimmersed to immersed to the thallus, not constricted at the base, or rarely somewhat constricted, 0.6–1.5 mm wide; margin rather thick and entire; disc plane. Exciple concolorous to the epithecium externally, colorless or pale brown internally; epithecium blackish-green; hymenium 40–60 μm high, I+ blue; subhymenium colorless; hypothecium with various heights, yellowish brown to blackish-brown. Paraphyses simple. Asci *Lecidea*-type, 8-spored. Ascospores: hyaline, simple, ellipsoid, 10–14 × 5–7 μm.

Spot tests: Thallus K+ yellow, then red, KC+ yellow, C–, P+ yellow, medulla K–, C–, KC–, P–

Secondary metabolites: norstictic acid

Specimen examined: CHINA. **Sichuan**, Xiaojin country, Mt. Balangshan, on rock, alt. 4300 m, 18 Aug. 1982, X.Y. Wang, 025318 (HMAS-L).

Comments —It is morphologically similar to *L. lapicida* but differs in the predominance of norstictic acid.

L. lapicida var. *pantherina* has been reported from Asia (Hertel 1977, Inoue 1982) Europe, and North America. Its southern hemisphere distribution is mapped by Hertel (1997). New to China.

4. ***Lecidea*** sp. 1 Fig. 1d

Thallus crustose, whitish gray to gray, developed well, esorediate, irregularly areolate. Areoles contiguous, flat to slightly convex, 0.2–0.9 mm in diam; cortex, 20–35 μm; medulla white, I+ deeply blue. Hypothallus distinct, black-blue.

Apothecia black, sitting in between the areoles, usually not overtopping the areoles, 0.5–1.2 mm wide, singular or in sometimes large and dense groups (then outline of apothecia angular). Margin thin; disc flat to slightly convex, dull, weakly pruinose. Epihymenium green-black, 12.5–20 μm; hymenium hyaline, 50–62.5 μm high; subhymenium hyaline to light yellow 30–70 μm thick; hypothecium pale brown. Paraphyses simple not branched. Asci *Lecidea*-type, clavate, 40–50 × 15–18 μm, 8-spored. Ascospores hyaline, simple, wall thick, ellipsoid to broadly ellipsoid, 6.2–10 × 3.5–5 μm.

Spot tests: cortex and medulla K–, C–, KC–, P–

Secondary metabolites (chemotype C): confluentic acid, unknown (Rf class 5, blue-white in UV fluorescence after charring)

Substrate: on wood.

Habitat: in arid climate. 38.2°N, 100.22°E

Specimen examined: CHINA. **Qinghai**, Qilian country, Mt. Niuxinshan, on dead wood, alt. 3200 m, 11 Aug. 2007, J.G. Liu, 20071571-1 (SDNU)

Comments —This species is characterized by its moderately thallus with a I+ deeply blue medulla, its distinct hypothallus, its pale brown hypothecium, and its small, thick-walled ascospores. This species is very close to *L. tessellata* but it has distinct blue-black hypothallus, an unknown secondary metabolite besides confluentic acid, and its cortex is a palisade plectenchyma. Besides, this species grows on wood while *L. tessellata* grows on rock.

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